

11/27/95

ADOT ECS File: JPA 95-216

AGREEMENT

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MATERIALS

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This Agreement is made by and between the American Association of State Highway and Transportation Officials, Inc. a corporation of the District of Columbia, with offices at 444 N. Capitol St. N.W., Suite 249, Washington, D.C. 20001, hereinafter referred to as the "ASSOCIATION," and Arizona Department of Transportation, 206 South 17th Avenue, Phoenix, Arizona 85007, hereinafter referred to as the "MEMBER DEPARTMENT."

WITNESSETH

Whereas, the ASSOCIATION is operating the National Transportation Product Evaluation Program, hereinafter referred to as the NTPEP, which requires that testing of certain materials, products and devices be carried out and reported in a prescribed manner approved by the ASSOCIATION; and

Whereas, the MEMBER DEPARTMENT is willing to carry out testing of certain materials, products and devices as specified herein, in accordance with the procedures established by the ASSOCIATION for the NTPEP:

Now, Therefore, in consideration of the mutual covenants and agreements hereinafter set forth, the sufficiency of which is hereby acknowledged, the ASSOCIATION and the MEMBER DEPARTMENT agree as follows:

1. Technical Assistance

- (a) The MEMBER DEPARTMENT shall do the test deck evaluations and furnish the data to Virginia DOT as outlined in the attached Project Work Plan for Field and Laboratory Evaluations of Sign Sheeting Material, which is hereby incorporated into this Agreement.
- (b) The MEMBER DEPARTMENT is equipped and qualified to do the test deck evaluations and furnish the data to Virginia DOT as outlined in the attached Project Work Plan for Field and Laboratory Evaluations of Sign Sheeting Material,
- (c) The MEMBER DEPARTMENT shall furnish all necessary personnel, materials, facilities, equipment, service and all other resources and capabilities necessary or desirable to do the test deck evaluations and furnish the data to Virginia DOT as outlined in the attached Project Work Plan for Field and Laboratory Evaluations of Sign Sheeting Material, and in full accordance therewith.

- (d) The MEMBER DEPARTMENT agrees to do the test deck evaluations and furnish the data to Virginia DOT as outlined in the attached Project Work Plan for Field and Laboratory Evaluations of Sign Sheeting Material, it will do the work in an acceptable workman like manner, as determined by the ASSOCIATION and in conformance with general practice as recognized by the state departments of highways and transportation that comprise the ASSOCIATION.

2. Period of Performance

- (a) The MEMBER DEPARTMENT shall complete the work described in the attached Project Work Plan in accordance with the following general schedule:
 - 1. Test panel will fabricated by Virginia in April, 1996 the panels will be shipped from Virginia to Arizona as soon as practical and will be installed on the field test decks no later than June 1996.
 - 2. Status reports will be made to the coordinator every six months
 - 3. The test deck interim report will be completed by August 1, 1997 and Final test deck report by August 1, 1998.
- (b) Whenever the MEMBER DEPARTMENT knows, or reasonably should know or anticipates, that any condition beyond its control is delaying or threatens to delay the timely performance of the testing work and the making of timely reports, it shall advise ASSOCIATION of the actual or expected delay, the cause thereof, and the then expected completion date of the testing work and reports.

3. Costs and Payments

- (a) The cost per sample (test deck evaluation only) under this Agreement and the attached Project Work Plan for field and laboratory evaluations for sign sheeting shall be one hundred dollars (\$100.00) per sample color adhesive and type. This amount is a fixed price per sample tested, (test deck evaluation only) and furnish data to Virginia DOT for one year and two year reports. It is agreed that in no event will the ASSOCIATION pay the MEMBER DEPARTMENT for costs incurred in excess of the fixed price per sample, unless a mutually acceptable separate written agreement is entered into between the parties.

(b) If testing work under this Agreement is terminated by the ASSOCIATION without cause, the amount payable to the MEMBER DEPARTMENT will be in proportion to the percentage of completion of the testing work as described in the attached Project Work Plan for field and laboratory evaluations of sign sheeting material, as of the effective date of such termination or suspension.

(c) The ASSOCIATION shall make payments to the MEMBER DEPARTMENT in accordance with the following procedure:

1. The MEMBER DEPARTMENT shall submit an invoice to the ASSOCIATION for reimbursement for the test deck evaluation work when it has completed all the evaluations on the samples and furnished data to Virginia for all the approved products as identified by the NTPEP Coordinator at the fee schedule out lined in (a) above, payable to the MEMBER DEPARTMENT under this Agreement, and the invoice being supported with accepted accounting principles and procedures.

2. Upon written request by and at the expense of the ASSOCIATION, the MEMBER DEPARTMENT shall permit a designated representative of the ASSOCIATION to inspect, copy and audit the MEMBER DEPARTMENT's books and records relating to the performance of this Agreement.

4. Stop Work Order

The ASSOCIATION may, upon not less than a ten day written notice to the MEMBER DEPARTMENT, require the MEMBER DEPARTMENT to stop all, or any part of the work called for by this Agreement. Upon receipt of such a stop work order, the MEMBER DEPARTMENT agrees to comply with its terms and take all reasonable steps to minimize the incurring of additional costs allocated to the work covered by the stop work order during the period of work stoppage.

5. Termination

(a) This Agreement may be terminated by the ASSOCIATION with a 30-day written notice to the MEMBER DEPARTMENT. In the event of termination by the ASSOCIATION without cause, the MEMBER DEPARTMENT shall be paid all costs and obligations incurred in accordance with this Agreement prior to the date of termination. Such reimbursement, together with other payments already made, shall not exceed the per sample cost times the number of samples approved for testing by the NTPEP Coordinator.

(b) This Agreement may be terminated by the MEMBER DEPARTMENT with a 30-day written notice to the ASSOCIATION.

- (C) Upon termination of the Agreement prior to its full term, the MEMBER DEPARTMENT agrees to provide to the ASSOCIATION all data collected up to the time of termination, and to provide required reports through such termination date.

6. Reports

- (a) Interim reports shall be prepared and delivered to the ASSOCIATION as required in the attached Project Work Plan for the field and laboratory of sign sheeting material.
- (b) After completion of the testing work, or upon termination of this Agreement under Section 5, the MEMBER DEPARTMENT shall make a final reporting in the manner described in the attached Project Work Plan.

7. Indemnification

- (a) To the Extent provided by law, the MEMBER DEPARTMENT hereby assumes its responsibilities for any loss resulting from bodily injuries (including death) or damages to property, arising out of any act or failure to act on the MEMBER DEPARTMENT's part, or the part of any employee of the MEMBER DEPARTMENT in the performance of the work undertaken under this agreement and contract.
- (b) To the Extent provided by law, the ASSOCIATION hereby assumes its responsibilities for any loss resulting from bodily injuries (including death) or damages to property, arising out of any act or failure to act on the ASSOCIATION's part, or the part of any employee of the ASSOCIATION in the performance of the work undertaken under this agreement and contract.

8. Proprietary Rights to Data

It is agreed that the ASSOCIATION shall be the owner of and shall have the exclusive proprietary rights, to the exclusion of the MEMBER DEPARTMENT, to all data and reports resulting from this Agreement, shall hold copyright thereto, and have the exclusive right to publish, disclose, disseminate and use in whole or in part any data and information received or developed under this Agreement.

9. Term of the Agreement

The term of this Agreement shall be for the period as stated in the attached Project Work Plan for the field and laboratory evaluation of sign sheeting material, measured from the effective date of the Agreement.

10. Effective Date

This Agreement shall become binding on the parties hereto and of full force and effect upon the signing thereof by the duly authorized officials for the ASSOCIATION and the MEMBER DEPARTMENT, the effective date being that upon which the last party hereto executes the Agreement as stated below.

11. Jurisdiction

This Agreement shall be construed in accordance with and governed by the laws of the District of Columbia and Arizona.

12. Interpretation

Where interpretation of the attached Project Work Plan for the field and laboratory evaluation of sign sheeting material and the terms of this Agreement becomes necessary, recourse shall first be had to the operating procedures established by the ASSOCIATION for the NTPEP, including the appeals process thereof.

13. Completeness

This Agreement is the complete and exclusive statement of the arrangement between the parties, and supersedes all proposals, oral or written, and all other communications between the parties relating to the subject matter thereof. It may be amended from time to time in writing by the mutual consent of the parties hereto.

14. Communications

All communications concerning this Agreement, including invoices and reports, shall be sent to:

For the ASSOCIATION:

Ken F. Kobetsky, NTPEP Coordinator
AASHTO
444 N. Capitol St. N.W. - Suite 249
Washington, D.C. 20001

For the MEMBER DEPARTMENT:

Mr. Doug Forstie
Assistant State Engineer
Materials Group
Arizona Dept. of Transportation
206 South 17th Avenue
Phoenix, Arizona 85007

with a copy to:

Department of Transportation
Joint Project Administration
205 S. 17th Ave, MD 616E
Phoenix, AZ 85007

In Witness Whereof, the parties have set their hands and seals by their duly authorized agents and representative on the day and year below written:

AMERICAN ASSOCIATION OF STATE
HIGHWAY AND TRANSPORTATION
OFFICIALS, INC.

Witness _____

By: _____

Date _____

Title _____

ARIZONA
DEPARTMENT OF TRANSPORTATION

Witness _____

By: _____

Date _____

AUGUST V. HARDT
Title Deputy State Engineer _____

**NATIONAL TRANSPORTATION PRODUCT EVALUATION PROGRAM (NTPEP)
OPERATIONAL PROCEDURES FOR TESTING OF SIGN SHEETING MATERIALS**

Sign Sheeting Manufacturers wishing to participate in the AASHTO National Transportation Product Evaluation Program must submit a product evaluation form (PEF) to the AASHTO NTPEP Coordinator by the *February 1, 1996*. The Product Evaluation Form must include Material Safety Data Sheets on the process color inks to be used with the sheeting along with other pertinent information. The AASHTO NTPEP Coordinator will assign each material a number as indicated below:

(examples)

SSM-9X-1 Manufacturer "A" Engineer Grade Pressure Sensitive
Sheeting

SSM-9X-2 Manufacturer "A" Engineer Grade Heat Activated Sheeting

SSM-9X-3 Manufacturer "B" High Performance Grade Pressure
Sensitive Sheeting

The manufacturer will be notified by February 7, 1996 of the NTPEP Coordinator's decision to test their material. The manufacturer will also be notified where to ship the material for testing. The materials will be sent to a sign shop in Virginia. Suppliers will submit to the assigned sign shop one roll of sign sheeting material approximately 1 meter (36 inches) wide by 15 meters (50 feet) long of each color and adhesive backing (for example):

SSM-9X-1

White	Pressure	Sensitive	Engineer	Grade
Yellow	Pressure	Sensitive	Engineer	Grade
Red	Pressure	Sensitive	Engineer	Grade
Orange	Pressure	Sensitive	Engineer	Grade
Green	Pressure	Sensitive	Engineer	Grade
Blue	Pressure	Sensitive	Engineer	Grade
Brown	Pressure	Sensitive	Engineer	Grade

The process color inks to be used with this sheeting must also be sent to the sign shop. The process colors submitted should include the following colors: red, blue, green, orange and black.

The samples must be clearly labeled with the assigned SSM-9X-number. The sample identification should include lot no., batch no., drum no., etc. The samples of material must arrive at the sign shop by April 1, 1996.

A week in April convenient to the sign shop will be assigned to fabricate test panels for outdoor exposure testing. Representatives of the manufacturers are requested to be present to provide guidance and expertise in the handling of their specific product.

If ink is submitted, it is particularly important that the representative be completely familiar with the ink application process. Manufacturers will normally be expected to arrange for disposal of leftover ink if it is not compatible with the Sign Shop waste stream. Virginia retains the right to recover from the manufacturer any excessive cost which results from disposal of surplus material.

SIGN SHOP PROCEDURE

1. Lead State Coordinator meets with Sign Shop Foreman and Manufacturer's Representative. Coordinator outlines procedure to track material. Coordinator explains that the sign shop personnel are at the disposal of the Representative, whatever directions or recommendations he suggests will be carried out. The sign panels will be 100 mm x 300 mm x 2.5 mm (4" x 12" x 0.1"), the aluminum alloy to be 5052. The Representative may reject any test panel. Extra panels will be made if necessary. Approximately 12 to 15 test panels per color and ink combination will be made (***depending on number of test decks***).
2. State Coordinator records all information on materials for testing: Item No., color, size, Lot No., etc. for sheeting and ink.
3. State Coordinator assigns number to each color and ink combination.
4. Aluminum sign blanks have some defects from the manufacturing, packaging and shipping processes. The Representative and the sign shop personnel may reject any panels they deem unacceptable.
5. Aluminum sign blanks shall be prepared in accordance with ASTM D4956, Subsection 8.2 before application of sheeting.
6. Sheeting will be applied according to manufacturer's recommendation using only equipment available in the sign shop.

It will be applied three different ways.

- (A) Pressure-Sensitive sheeting may be applied by placing the 100 mm x 300 mm (4" x 12") panels on a large aluminum sign blank. The sign blank will then run through a pressure sensitive applicator.
- (B) Pressure-Sensitive sheeting may also be applied by small hand applicators.

(C) Heat-Activated sheeting will be applied by vacuum and heat.

7. Inks are applied according to the manufacturer's recommendation. The ink covers an area 75 mm x 280 mm (3" x 11") leaving approximately 10 mm ($\frac{1}{2}$ ") border around the edge of the panel for handling purposes.
8. Screen size used with the ink:
Monofilament White Mesh No. 158 HITECH thread diameter 64 microns (0.0025"), mesh opening 90 microns (0.0035"), open areas 32%, 2 meter (80") width.
9. The Manufacturer's Representative will be allowed to select the panels that will go to the test deck sites in **(4 different State DOT locations)**.
10. Once the panels have been selected for the test deck a sample of sheeting approximately 4 meters (12 feet) in length and 1 meter (36 inches) wide will be sent to Louisiana DOTD for laboratory testing.

AASHTO NTPEP TEST PANEL PREPARATION AND TRACKING PROCEDURE

The manufacturer of SSM-9X-1 submits their pressure sensitive grade sheeting to the designated Virginia DOT sign shop for test panel preparation. The manufacturer submits one roll of white, yellow, red, orange, green, blue and brown sheeting along with one liter (one quart) of red, blue, green, orange and black ink. The sign shop cooperating with the company representative fabricates test panels for outdoor weathering at AASHTO NTPEP Test Decks. The sign panels are 100 mm x 300 mm (4" x 12"). The following quantities of panels will be fabricated.

- 40 per test deck** panels of white sheeting
- 10 per test deck** panels of yellow sheeting
- 10 per test deck** panels of orange sheeting
- 5 per test deck** panels of red sheeting
- 5 per test deck** panels of green sheeting
- 5 per test deck** panels of blue sheeting
- 5 per test deck** panels of brown sheeting

The manufacturer will examine all the panels fabricated and give his approval before any of the panels are inked. After approval of the panels fabricated with white sheeting, **(3 per test deck)** white panels will be selected to go to the AASHTO NTPEP test decks while the remaining white panels will be inked according to the following scenario with extra panels being made when necessary.

- 6 per test deck** panels of white sheeting with red ink
- 6 per test deck** panels of white sheeting with orange ink
- 6 per test deck** panels of white sheeting with green ink
- 6 per test deck** panels of white sheeting with blue ink
- 6 per test deck** panels of white sheeting with black ink

After approval of the panels fabricated with orange and yellow sheeting, **(3 per test deck)** panels will be selected to go to the AASHTO NTPEP test decks while the remaining orange and yellow panels will be inked as follows:

- 6 per test deck** panels of yellow sheeting with black ink
- 6 per test deck** panels of orange sheeting with black ink

Each panel will receive a number for tracking purposes. The numbers run consecutively from 1 to 10,000 beginning with the first available number for the year in which the panels are made.

The manufacturer will examine all the above listed panels and select **three** panels of each sheeting and ink combination to go to **each of** the AASHTO NTPEP test decks.

The white panels selected to go to the test deck will be assigned the first available number for the year along with a letter (e.g. 551A). **One third** of the white panels will be assigned the letter A. **One third** of the white panels will be assigned the letter B. The other **third of the** white panels will be given the letter C.

The yellow panels selected to go to the test deck will be assigned the **next** available number for the year along with a letter (e.g. 552A). **One third** of the yellow panels will be assigned the letter A. **One third** of the yellow panels will be assigned the letter B. The other **third of the** yellow panels will be given the letter C.

The process will continue until all panels have been given a number and a letter (i.e. orange sheeting with black ink will be given the number 562).

The number and letter combination will then be etched on the back of each sign panel with an electric engraver.

One set of panels will be sent to each of the AASHTO NTPEP Test Decks.

One set of panels is defined as the 36 panels labeled as follows:

551A, 551B, 551C

552A, 552B, 552C

553A, 553B, 553C

etc.

562A, 562B, 562C

These 36 panels represent SSM-9X-1.

When the manufacturer of SSM-9X-2 submits heat activated engineer grade sheeting to the sign shop for application, the white panels will be assigned the number 563, the yellow panels the number 564, etc. They will also be assigned a letter A, B or C. This sequence will continue until all the manufacturers and their respective products have been assigned a number and letter.

A set of these test panels will also be sent to each AASHTO NTPEP test deck: one in Louisiana, one in Minnesota, one in Arizona one in Virginia. A test deck consists of a number of Outdoor Exposure racks facing south and inclined at an angle of 45 degrees from the horizontal as stated in ASTM G7 - 89. *Other test decks may be added.*

TEST DECK LOCATIONS

Arizona's test deck is located in a hot dry climate and the other in the mountains.

Louisiana's test deck is located in Baton Rouge at the Louisiana D.O.T.D. Traffic Services Section on Tom Drive.

Minnesota's test deck is located near the Maplewood test laboratory north of St. Paul Minnesota.

Virginia's test deck is located at its McDowell Area Headquarters on Route 250 between the Shenandoah Mountains and the Allegheny Mountains near the Virginia, West Virginia border.

TEST DECK PROCEDURE

1. Each Test Deck will receive approximately 150 panels each year labeled xA, xB and xC.
2. Each panel received by the test deck will be examined closely. Any minute flaw will be recorded in a notebook.
3. Initial Coefficient of Retroreflection Values for panels xA, xB and xC (x = 551, 552, 553, etc.) will be measured in a 15 or 30 meter (50 or 100 foot) Light Tunnel in accordance with ASTM D4956, Subsection 8.3. The Coefficient of Retroreflection value will be recorded at an observation angle of 0.2 degrees and an entrance angle of -4 degrees and +30 degrees. The rotational angle will be 0 and 90 degrees. The rotational angle of 0 degrees is when the number and letter on the back of the panel are at the top (closest to the light source).
4. Initial chromaticity will be measured in accordance with ASTM D4956, Subsection 8.4 and recorded on panel A, B and C of each number. Panel C will be retained in the laboratory for comparison purposes. Final chromaticity values for panel A and B will be obtained and indicated in the final report.
5. Initial portable reflectometer readings will be taken. Each panel shall be measured on the top, middle, and bottom. The average of these readings on each panel shall be recorded on the report. In the case of barricade or other preprinted sheeting, the different colored areas will be read separately.
6. Panels labeled xA and xB will be placed on the outdoor exposure racks on June 1, 1996 or as soon as possible thereafter.

7. Panels labeled xC will be stored in a file cabinet or other suitable storage place protected from the sunlight and weather.
8. Portable reflectometer readings of panels A, B and C will be made initially, at 6 months, 1 year and 2 years. The test panel will be wiped with a soft damp cloth and allowed to dry prior to being read with the portable reflectometer. The control panel will be read at the test deck site at the same time the test panels are being read.
9. Visual comparison with the control sample will be made at 6 months, 12 months and at the end of two years. Samples will be evaluated as to colorfastness, shrinkage, expansion, blistering and cracking.
10. Panels labeled xA and xB (x = 551,552,553 etc.) will be taken down from the Outdoor Exposure Rack June 1, 1998.
11. Final Coefficient of Retroreflection values from Panels xA, xB and xC will then be measured in the same 15 or 30 meter (50 or 100 foot) light tunnel in which the initial Coefficient of Retroreflection values were obtained. The test panels will be washed with distilled water and dried prior to measurement. Values shall be obtained as described in Paragraph 3 above.
12. Final evaluation for colorfastness, shrinkage, blistering and cracking will be made. In addition to visual observations for colorfastness, chromaticity values will be taken in accordance with ASTM D4956, Subsection 8.4.
13. Findings will be reported to AASHTO NTPEP Sign Sheeting Committee.
14. If possible Panels xA and xB will be returned to the Outdoor Exposure Racks within 2 weeks for additional exposure if the individual state agrees to perform the extra testing.
15. Weather information from the National Weather Service station nearest each test deck will be summarized and recorded in the final report.

VISUAL RATING SYSTEM

COLORFASTNESS - L-S-300C SUBSECTION 4.4.9.1

This Colorfastness rating is taken entirely from L-S-300C, Subsection 4.4.9.1 except the evaluation is done without wetting samples. Holding dry control panel C beside dry test deck panels A and B evaluate them as follows:

- Excellent - No perceptible change in color
- Good - Perceptible change in color
- Fair - Appreciable change in color
- Poor - Color not recognizable as original color

Appreciable change in color means a change that is immediately noticeable when making the comparison. It should be noted that the difference between the "Excellent" and "Good" categories is small. As with any subjective evaluation, it is dependent on the operator and light conditions at the test site.

SHRINKAGE - L-S-300C SUBSECTION 4.4.9.2

Shrinkage will be reported as the number of inches between edge of the sheeting and the edge of the Aluminum panel at two years. Expansion will also be noted in this category.

CRACKING

This category will evaluate sheeting or the ink on sheeting for cracking, crazing or scaling. An abbreviation will be made on the report form. The explanation of the abbreviation will appear in the Notes on Visual Data Collection.

BLISTERING

This category will evaluate sheeting or the ink on sheeting for Blisters, Delamination or Edge Lifting. An abbreviation will be made on the report form. The explanation of the abbreviation will appear in the Notes on Visual Data Collection.

LABORATORY EVALUATIONS

Upon completing the preparation of the panels for the outdoor test decks, samples of the remaining sheeting will be received from Virginia DOT for evaluation in the Louisiana DOTD Materials and Testing Laboratory. Test methods used in evaluation of the sign sheeting materials shall be as listed in Table 1.

TABLE 1

TEST METHODS USED IN EVALUATION OF RETROREFLECTIVE SIGN SHEETING

Tests Performed	Fed. Spec. L-S-300C	ASTM D4956-90	Comments
Adhesion: Protective Liner Removability Adhesive Peel Strength		8.10 8.5	
Flexibility		8.9	
Impact Resistance		8.11	
Heat Resistance	4.4.10.1		
Cold Resistance	4.4.10.2		Tested at -20 °F
Humidity Resistance	4.4.10.3		Tap water used in testing
Shrinkage		8.8	
Daytime Color: <i>Fluorescent colors</i>		8.4 <i>E 991-90</i>	
Luminance Factor (Y%): <i>Fluorescent colors</i>		8.4 <i>E 991-90</i>	
Specular Gloss		8.12	
Coefficient of Retroreflection		8.3	
Reboundable Sheeting:			
Impact Resistance		S2.2.1	
Flexibility		S2.2.2	
Adhesion		S2.2.3	